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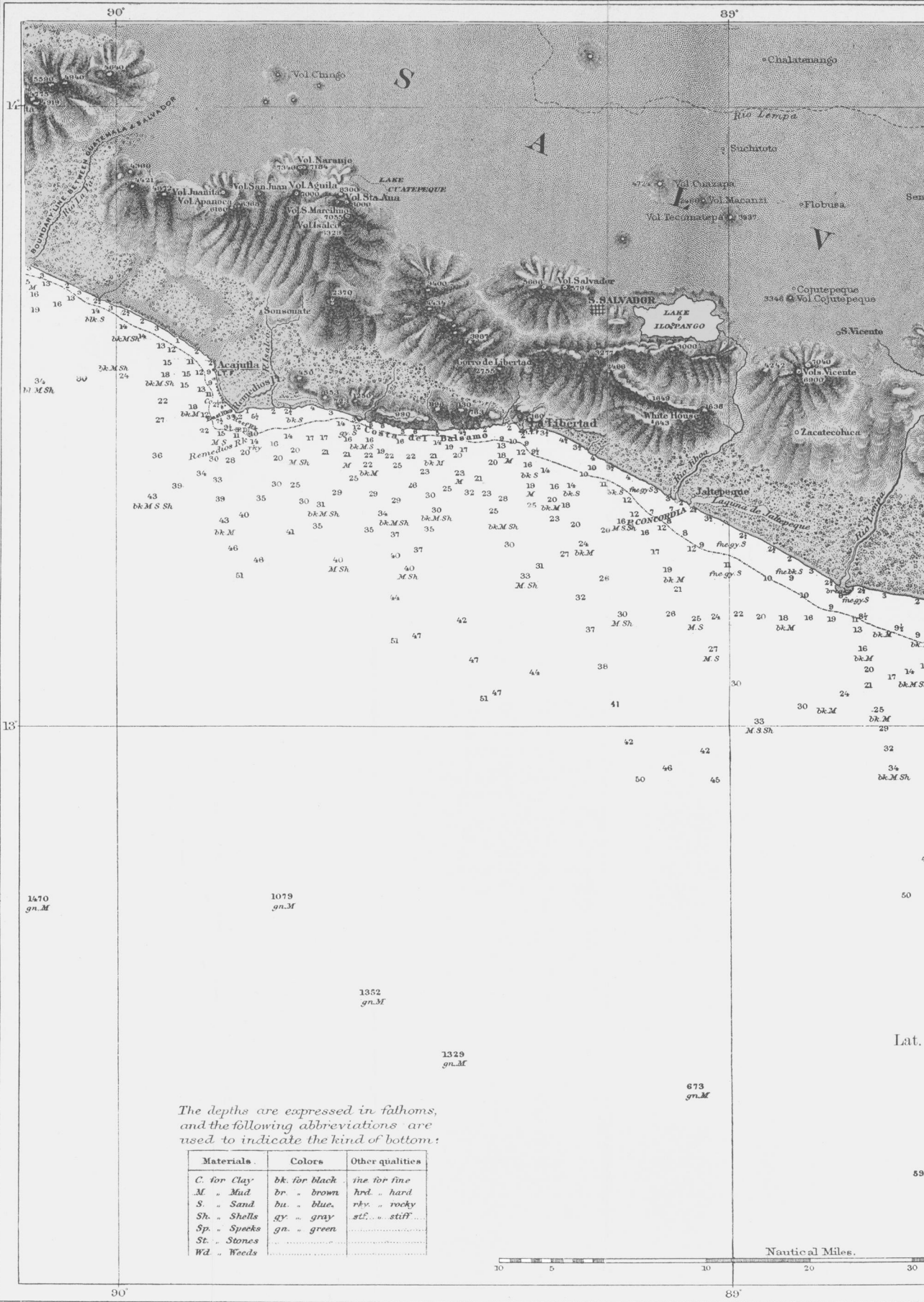
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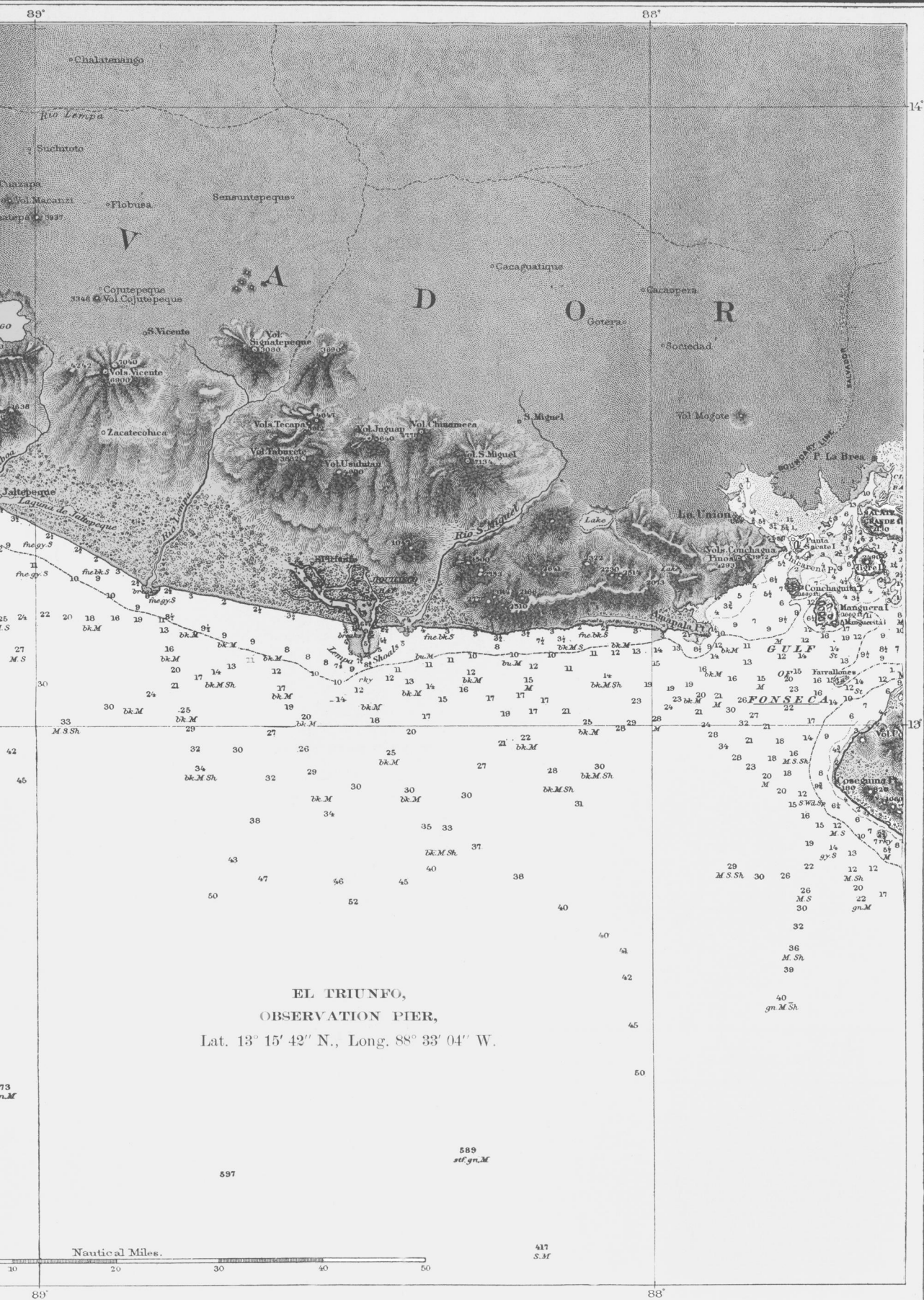


The depths are expressed in fathoms,
and the following abbreviations are
used to indicate the kind of bottom:

Materials.	Colors	Other qualities
C. for Clay	bk. for black	fine for fine
M. " Mud	br. " brown	hrd. " hard
S. " Sand	bl. " blue	rvy. " rocky
Sh. " Shells	gy. " gray	stf. " stiff
Sp. " Specks	gn. " green	
St. " Stones		
Wd. " Weeds		

Nautical Miles.

10 5 10 20 30



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THE RECENT SURVEY OF JIQUILISCO BAY AND EL
TRIUNFO, THE NEW PORT OF SALVADOR.

BY

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The officers and enlisted men of the United States steamers *Bennington* and *Marion* have just completed a survey of Jiquilisco Bay, Salvador, for the purpose of facilitating the entrance of ships to the Port of El Triunfo, in that country. A harbor where vessels of commerce can lie in shelter and load and unload is of vast importance on the Central American coast, and especially in Salvador, within whose borders the only harbor, hitherto known and used, is La Union. There are ports at La Libertad, Acajutla and Concordia; and one would naturally expect from this title that something pretending to a bay, or deep indentation at least, would have warranted the appellation. But at La Libertad there is only a straight, sandy beach, on which breaks the Pacific Ocean, lying between two slightly projecting ledges of rock about a mile asunder; and this is also the condition at the other places. It is law and interest only that has made them ports, for they derive their existence and importance from their proximity to the respective cities of San Salvador, Sonsonate and San Vicente. Iron piers have been built out beyond the surf line at these places, and in smooth or moderate weather passengers and freight can be landed upon their outer ends. Vessels lying at anchor off these ports roll heavily, and are so much exposed that, during the rainy season, on account of the violent squalls of wind and rain, steamers generally get under way at nightfall and stand out to sea, returning in the morning to resume the discharging or loading of the cargo.

Jiquilisco Bay offers a port where the cargoes of vessels may always be handled in smooth water, and it extends its navigable

branches far into the rich alluvial belt bordering the coast—even to within a league of the Rio Lempa, the principal stream of Salvador, which is reported to be navigable by small steamers for probably one hundred miles, but hopelessly barred from seaward. In a work of 1632, describing Central America, Padre Thomas Gage, an English friar, thus mentioned the Rio Lempa: "This river is privileged in this manner, that if a man commit any heinous crime, or murder, on this side of Guatemala or San Salvador, or on the other side of St. Miguel or Nicaragua, if he can flie to get over the river, he is free as long as he liveth on the other side, and no justice on that side whither he is escaped, can question or trouble him for the murder committed. So likewise for debts; he can not be arrested."

In 1798, the Royal Consulate of Guatemala ordered Don Vicente Rodriguez de Camino to survey this lagoon. He states that it was then named the Bay of San Salvador de Jiquilisco. According to his chart, the anchorage is good and well sheltered, and the coast of the mainland, like that of Tehuantepec, appears to be fronted by a long, narrow island, perhaps formed by the tremendous surf raised by the prevalent winds.

Among the many undeveloped resources of San Salvador, coal may come to have a first value. Mr. E. G. Squier, when he was United States Minister to Salvador, said there was reason to believe that vast beds exist throughout the valley of the Rio Lempa, and in the valleys of some of its principal tributaries, over a region 100 miles long by not far from 20 miles broad. It had long been reported to exist, but he set the question at rest after his visit in 1853, by proper investigations. Coal was found in the valley of the Titiguapa, flowing into the Lempa from the west, also in the valley of the Rio Torola, and large beds are reported to exist near the town of Ilobasco. The coal is all of the variety called brown coal, and is a later formation than what is known as bituminous coal. Similar coal is extensively used in Germany for various mineral purposes.

Early in 1847, at the request of the President of Salvador, who desired to know whether it was possible to open the port of El Triunfo to commerce, the Count of Güeydon, commanding the French brig of war *Génie*, caused a survey of the bar at the entrance to be made, and thus reported in a letter dated February 4, 1847: "After a careful survey of the places, I have become convinced that it is possible and even easy to pass the bar with ships of large tonnage because at low tide there is never less than four metres of water. . . . The banks which are found on this part of the coast are not shifting, as is said, and I am convinced that its (the bar's) position has remained the same for a great number of years."

The officers of the U. S. S. *Tuscarora*, while engaged in a survey of the west coast of Mexico and Central America, between the years 1880 and 1884, examined the Jiquilisco bar and found two and one-half fathoms of water there. This was followed by a survey finished in September, 1894, under the orders of "El Triunfo Company, Limited"; and later, in November, 1895, by soundings taken by Don Tomas Stitch Bonelli, official engineer of the Government of Salvador. All these later soundings, whether expressed in fathoms, metres or varas, agree in assigning a depth of 14 feet at low water. Although it seems reasonable to expect, considering the strong currents sweeping past outside and the vast volume of water flowing in and out with the tide, that the deposit and scouring away of sand may vary the depths on the bar in the course of time, yet an examination of the history of former surveys appears to establish the fact that there has been very little variation of depth of water on it since the earliest surveys.

The Lempa Shoals, as the sand banks at the entrance to Jiquilisco Bay are called, are in the shape of a horseshoe, with the two ends resting on the shore. The oval part extends south. A narrow and nearly straight channel runs down between the arms and ends at the bar at the extreme of the oval. The horseshoe is three miles wide and about the same in length; the western arm, owing to the trend of the coast, being somewhat the longer. Judging from the older charts, it has remained the same, in depth and outline, for a century. Concerning the material of which it is composed, the surveyors report: "The Lempa Shoals are a deposit of very fine gray and black sand. If this sand is dried, a magnetized knife-blade thrust into it comes out looking like a delicate brush" The width of the fourteen-foot channel, leading over the bar between the lines of breakers, is about 300 yards, and its length, from the eighteen-foot line on the outside to the eighteen-foot line on the inside, is 200 yards. Nevertheless, the passage over it is not difficult with a competent pilot. It is believed that no great expense would be involved in deepening the water over it by cutting it out with a drag during the ebb tide.

Although Jiquilisco Bay has so long been recognized as favorable to the development of an extensive region of great fertility and diversity of products, no port was opened upon it until recently. It is reported that many attempts have been made, but that the weight of private interest in neighboring ports turned the scale against it until 1893, when a port was finally opened to commerce. This is the port of El Triunfo, which was started by "La Com-

pañía del Triunfo," a company formed by American and Salvadorean capitalists for the purpose of establishing steam navigation in the new port and developing the commercial and agricultural industries by facilitating the means of exporting the products of that region. On November 7, 1894, the Government of Salvador granted to this Company the exclusive right of steam navigation in the whole bay of Jiquilisco. A town site was marked out by the Government, lots were gratuitously given to settlers, and El Triunfo has now a population of 250 natives, 6 Americans, 6 Greeks, and 1 Englishman. A pier has been built; steam tugs and launches, adequate to the service of the new port, have been provided; the custom-house, post-office and military headquarters have been duly organized; and communication by telegraph established with the Capital.

The principal exports are dyewood and coffee. Nearly all the coffee is shipped to Germany. A little is sent, by the steamers of the Pacific Mail Steamship Company, to the United States.

The imports from the United States consist of flour, timber, and sugar and coffee making machinery; and, from Europe, of wines, liquors, canned goods, barbed-wire fencing, and corrugated-iron roofing.

During the last eight months of 1895, the importations and exportations yielded to the custom-house at El Triunfo the amount of \$38,537.37, there having been exported 12,920 quintals of coffee alone during that time. The following figures will show how rapidly the business in this new port is increasing:

During the single month of April, 1896, the receipts at the custom-house reached \$30,000.00, while for the same time the exportation of coffee amounted to 14,997 quintals. The total exportation of that article for 1896 has been double that of the previous season, and it is estimated that the exportation of the '97 crop through the port of El Triunfo will reach 75,000 quintals.

The opening of this port will stimulate the agricultural and other industries in a certain region of Salvador where development has not been possible heretofore on account of the lack of exportation facilities. Owing to that need a vast district capable of producing sugar-cane, cacao, cotton, coffee, tobacco, fruits and cereals has developed but little beyond local requirements. It is therefore a matter of congratulation that the Navy Department undertook this work, and that it was executed with thoroughness.

The survey was conducted from an accurately measured baseline, nearly two miles long, lying along the ocean beach of San

Sebastian Island. Triangular battens were laid in forked iron rods, lined up with a theodolite and levelled, then measured with a steel tape. Two independent measurements, each corrected for temperature, were made, and the mean value taken as the required length. From this base-line a network of triangulation was carried on throughout the extent of the bay among signals erected at close intervals along the shores. These signals were also used in the determination of the positions of the soundings by sextant angles measured between them. On the accompanying chart the characteristic soundings only are given. They are selected from numerous soundings recorded on the original plotting sheets. The geographical position stated in the chart may be regarded as well determined. The longitude depends upon the transportation of time by chronometers from La Libertad, where a longitude of the first order was determined in 1884 by telegraphic time signals from Panama, in connection with the work of establishing a chain of telegraphic longitudes, by submarine cable connections, that was carried on by the U. S. Hydrographic Office during the decade following 1874. The observation spot at El Triunfo is a rectangular pier about three feet high, built of stone and cement, situated about 50 yards E. S. E. of the Triunfo Company's storehouse, and about the same distance to the southward of the custom-house. Here twelve separate sets of star observations for longitude were made at different times, with the sextant and artificial horizon; and fifteen separate determinations of the latitude were made.

From tidal observations made from a staff gauge secured to a pile under the wharf at the southwest corner of the freight house at El Triunfo, from January 3 to March 31, 1897, the corrected establishment of the port was found to be three hours and twelve minutes and the mean rise of the tide, above the plane of mean low water, six and six-tenths feet. There was a second tide station established in the cove just inside of Point San Juan, the western headland of the entrance. Observations from a staff gauge were also commenced here on January 3, 1897, and carried on more than a month, with a resulting establishment of two hours and thirty-eight minutes, and a mean rise slightly less than that prevailing at El Triunfo. The tide-gaugers, who lived on shore in order to secure uninterrupted series of observations, caught a glimpse of the animal life of this region in the immense flocks of pelicans, white ibises, cranes, herons and curlews which covered the sandy beaches; in the peculiar-looking crabs of various shapes, sizes, and colors that crawled about the beach and up and down the trees;

in the porcupine and jaguar which visited the observers' tent one night; in the few alligators which made their headquarters in the waters near by; and in the many iguanas—large lizards—which were killed because their flesh is good to eat for such as can overcome their aversion to the looks of the animal, and because their skins, when cured, are excellent for the manufacture of such articles as card-cases and pocket-books. In Eden's English translation of "Peter Martyr" the edibility of the iguana is referred to in these quaint terms: "These serpentes are lyke unto crocodiles saving in bigness. They call them guanas. Unto that day none of owre menne durste adventure to taste of them, by reason of theyre horrible deformitie and lothsomeness. Yet the Adelantado being entysed by the pleasantness of the King's sister, Anacoana, determined to taste the serpentes. But when he felte the flesh thereof to be so delycate to his tongue, he fel to amayne without al feare. The which thyng his companions perceiving, were not behynde him in greedyness: insomuch that they had now none other talke than of the sweetnesse of these serpentes, which they affirm to be of more pleasant taste than our phesantes or partiches."

The reports both early and late agree in conveying the information that Jiquilisco Bay extends northwestward for a distance of fifteen miles beyond El Triunfo and the limit of the survey as represented upon the accompanying chart, and that its western end lies within a league of the Lempa River.

The physical characteristics of the Barra del Espiritu Santo at the mouth of the Lempa are sufficient to indicate that the river is of such magnitude and character that, even if nothing more were known of it, we might reasonably hope that by artificially reopening the connection, once doubtless naturally open, between it and the bay, steam navigation might be carried on from the ocean to the interior of Salvador.

But fortunately the Lempa has been examined sufficiently to give rise to the statement that small steamers may ply upon it for one hundred miles from its mouth, and there is enough mineral wealth in the valley of the Lempa to warrant Salvador in making a way to transport it to the sea. And when the products of the labor of the people may be loaded in Central Salvador in the morning and by evening be floated to the exporting wharves near the sea, then may the name El Triunfo, originally bestowed to commemorate one of those ephemeral triumphs which were common in these countries in the days of their distraction, be conferred afresh upon the foundation of enduring prosperity.